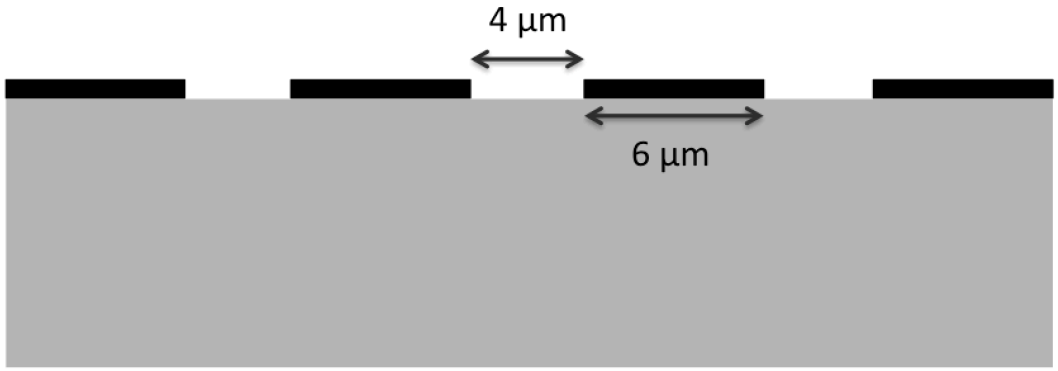
Exercise Nanofabrication 09/09

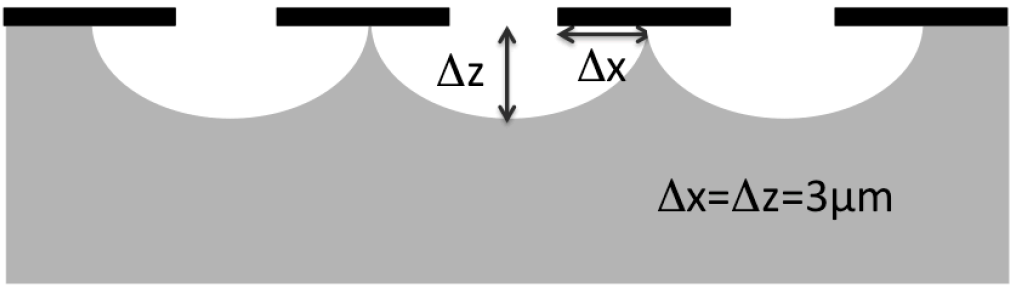
Exercises 1 and 2
See lecture notes.

Exercise 3): Isotropic etch: etches at the same rate in all direction.
Consider the following substrate (gray) with an etch mask (black).

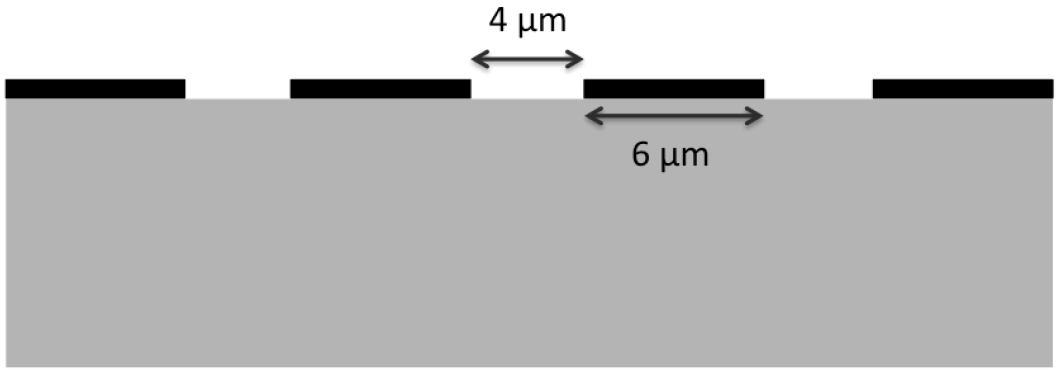


What is the maximum height difference that I can create using an isotropic etch?

Answer:



Exercise 4: Anisotropic etch: etches at a different rate in z and x.
Consider the following substrate (gray) with an etch mask (black).



Using an anisotropic etch where the etch rate in z is 3 times the etch rate in x,

what is the height difference at which the etch mask will no longer be connected to the substrate?

Answer:
9 µm (3x3 µm)

Exercise 5:
In general, etch mask are also etched by the etchant, but at a much lower rate than the material below.
Let's consider a purely vertical etch of the gray material, with an etch rate of 1 µm/min. The etch mask is 2µm thick and is etched at 50 nm/min.
How long can I etch the material?
What will be the corresponding depth of this etch?

Answer:
The etch mask is etched after 2/0.05 min= 40 min
The gray material will be etched 40 µm after 40 min.